Rapid, Comprehensive, Mission Architecting at the Jet Propulsion Laboratory

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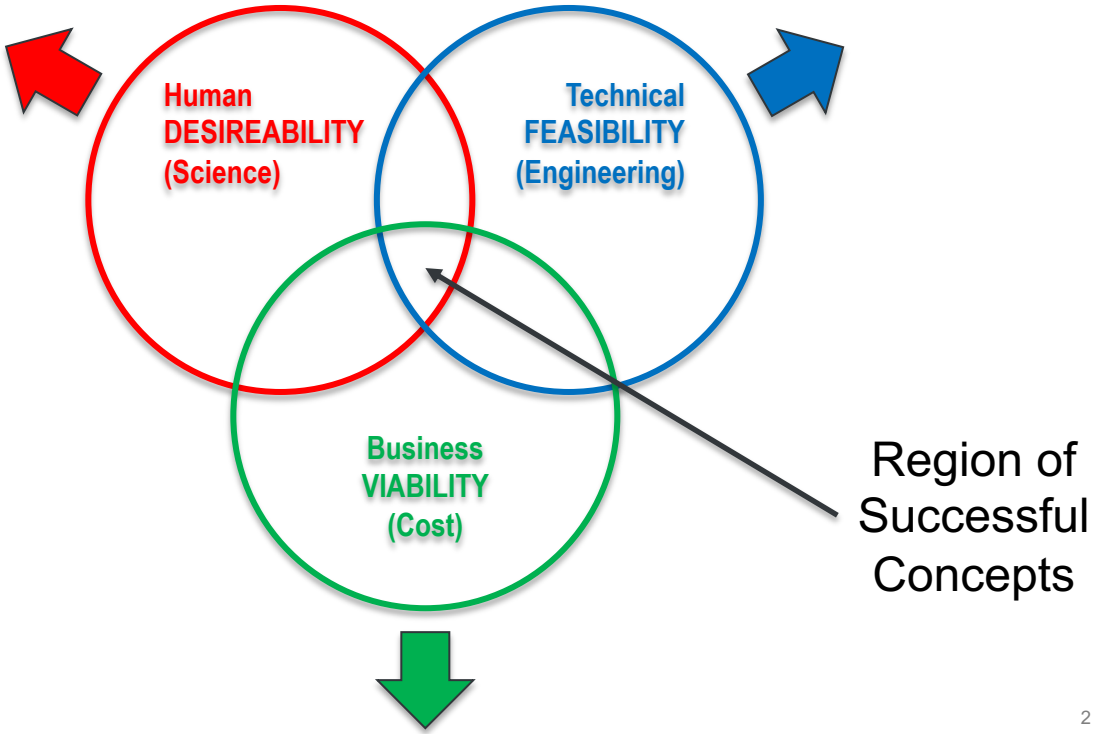
Jet Propulsion Laboratory
California Institute of Technology

The Challenge of Pre-Phase A

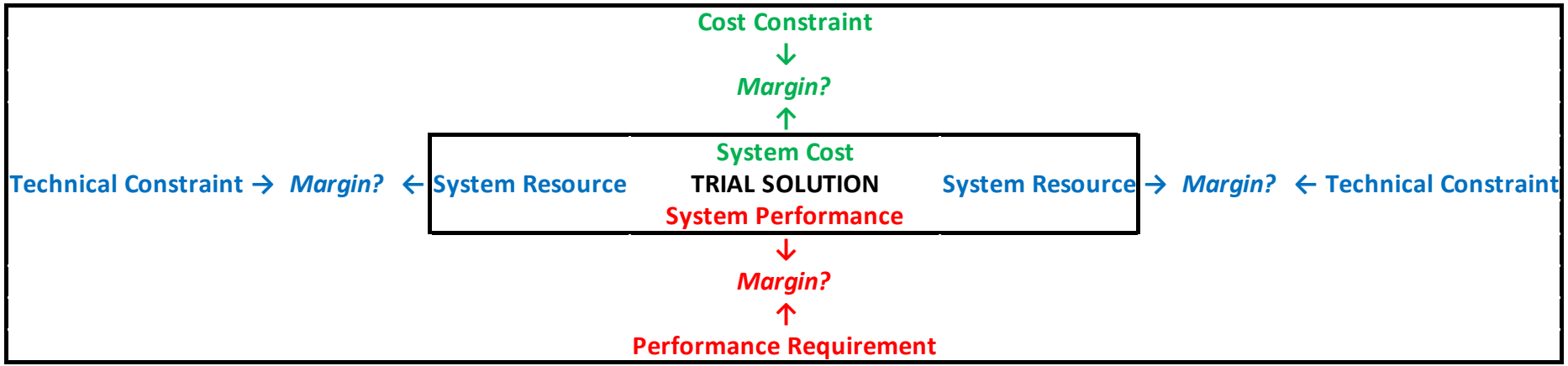
Answering the question, "*Why can't I have what I want?* "

so that all stakeholder groups believe the answer, simultaneously.



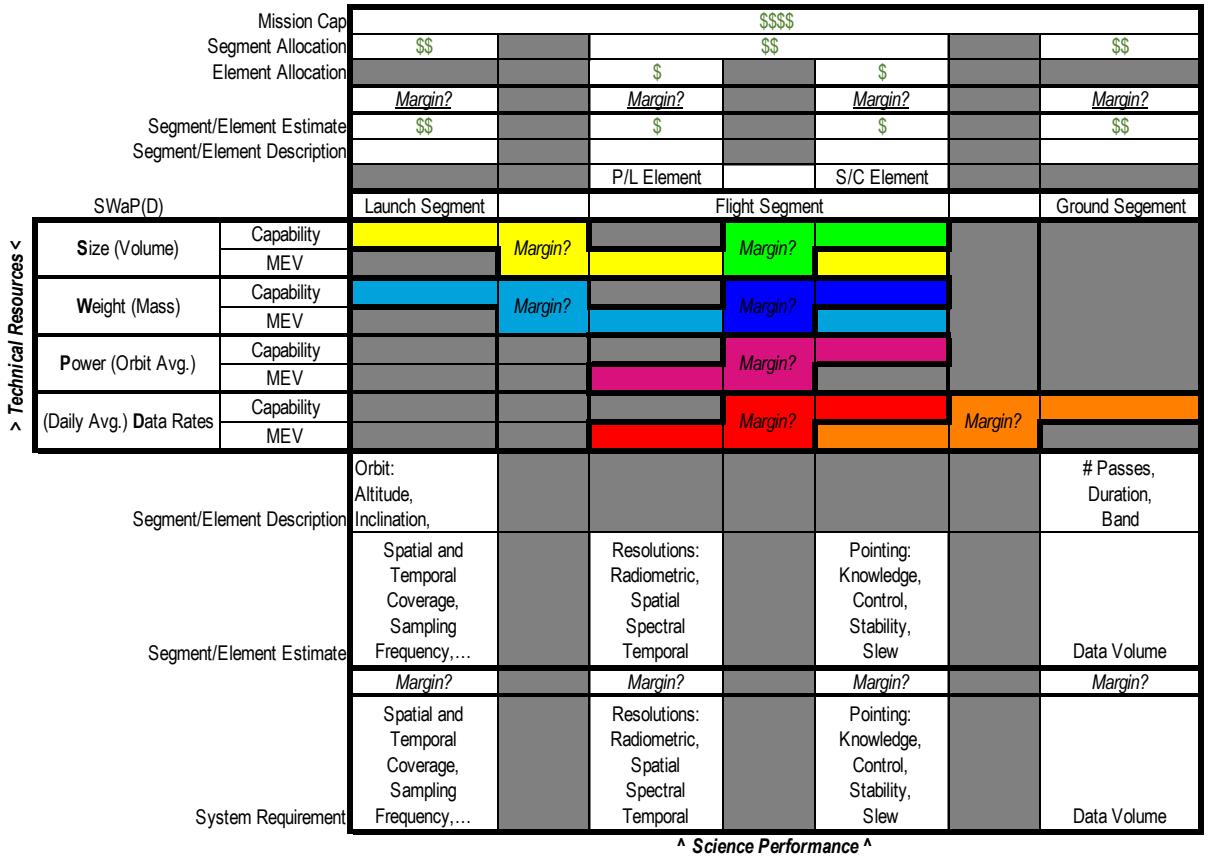
Solution: Concurrent Constraint & Requirement Margins Visualization

Does the trial solution fit in the box in all dimensions?



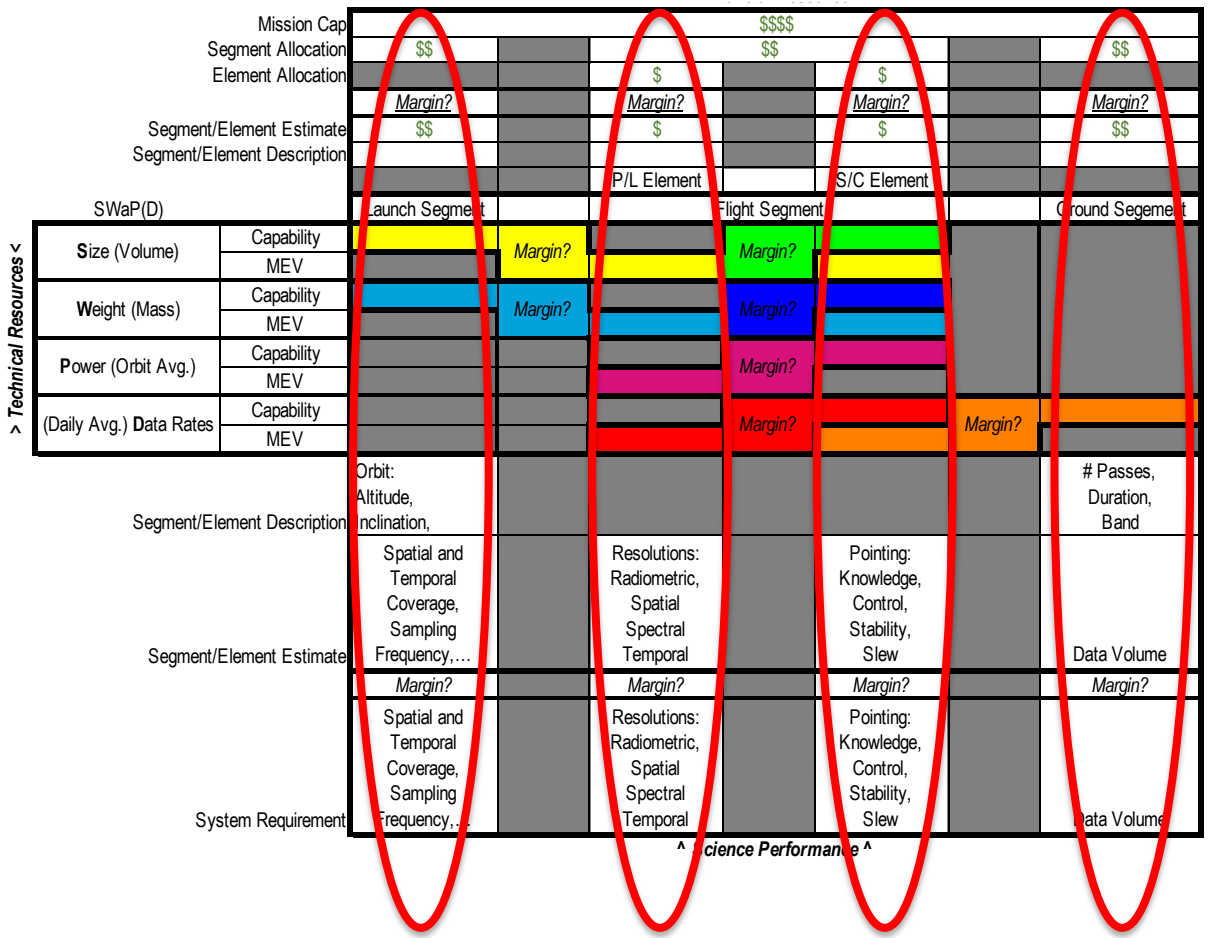
Applied to Segment Level Architecture

The “S-Chart”



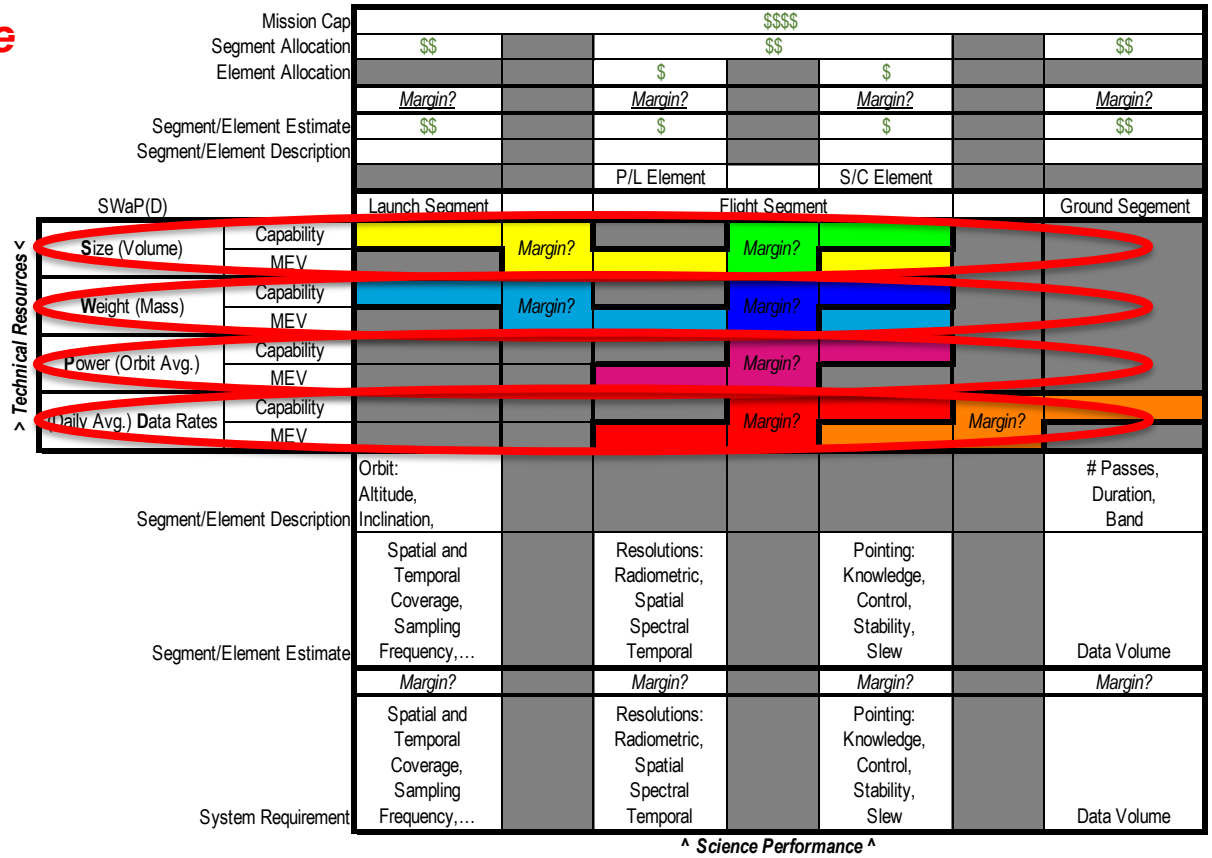
Applied to Segment Level Architecture

Concurrent



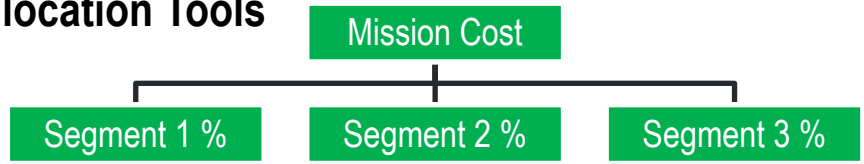
Applied to Segment Level Architecture

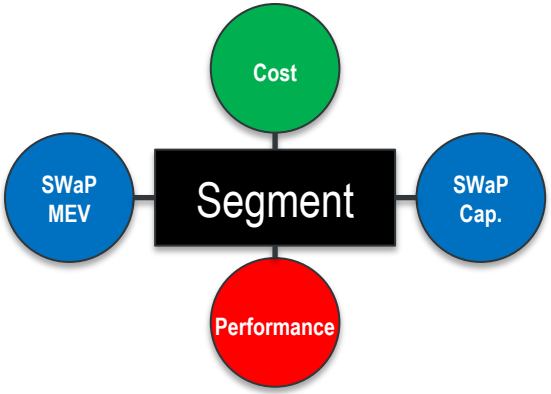
Collaborative



Required Infrastructure

- **Personnel**
  - Facilitator, Segment Subject Matter Experts (Launch Segment, Instruments, Spacecraft, Ground Systems)
- **Cost Allocation Tools**





- **Segment Level Analogy Database with Attributes**
- **Parametric Attribute Relationships**

$$\frac{\partial Attribute_i}{\partial Attribute_j} \text{ for all } i,j$$

- **Projection Facility**

Benefits

- Factor of 2 in Session Duration
  - Sometimes multiple architectures in 3 hours, compared to 6 hour typical Team-X study.
- Stakeholder Buy-In
  - Inconsistencies immediately apparent
  - Problems don’t disappear into another dimension, they get backed up against a wall.
  - Multiple trial solutions can be examined.

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